

Review of: Accurate and fast prediction of radioactive pollution by Kriging coupled with Auto-Associative Models

2025-04-04

The paper presents an innovative approach that combines Kriging and Auto-Associative encoders for fast estimation of the dispersion of radioactive pollutants in the atmosphere as support for the first response phase in a nuclear emergency.

The paper deserves publication once some minor revisions are addressed. In general, the paper requires a thorough review of the incorrect internal references of figures, paragraphs, etc., as well as an improvement of the English language.

Detailed notes:

- Section 1.1, first paragraph. The authors should present other possible approaches adopted from other entities to address these issues and not only reference their (and their institute's) previous paper on the subject.
- line 35. There is a missing reference for the pX code.
- line 55. double *both*
- Section 1.2, last paragraph. References to later sections are inconsistent, please check them. Section 5 is not mentioned or described.
- Table 1. The table requires additional explanations. The range of variation for each of the input variables is not discussed. For example, Release Height is taken between 0 and 100 m. Is it accurate to consider a release height of 0 m? Why cap it at 100 m? Explain the decisions taken and give references for the choices when possible.
- line 120. The description of the Kriging methodology is too vague. Improve it and add additional references for the reader to check.

- equation at line 126. \forall symbols usage is inappropriate, rephrase as $\forall i \in [1, N]$ or similarly
- equation at line 126. $K(x, x_i)$ is not consistent with the K at left-hand side, x and x_i should probably be switched. If this is not the case, please explain better what you are doing here.
- Section 3.2, last paragraph. Add some explanation and references for the BFGS algorithm and the procedure that you adopted.
- line 143. Please rephrase by stating the range of values.
- lines 145-148. The authors claim 9 coordinates is the sweet spot between accuracy and computational cost. A graph of the behavior of the accuracy (or, equivalently, of the error) as a function of the number of coordinates helps in conveying the claim.
- line 149. remove *Once these emulators built*.
- line 157. Missing closing parenthesis.
- lines 160-162. The figure reference is wrong. The description of the actual figure 4 is missing. The last phrase should be rewritten with additional explanation.
- Figure 7 caption. The numbers seem to be coming from figure 4, and they do not correspond to the description in line 184. Please check which ones are correct.
- line 188-189. Cases 3 and 4 seem to be switched with respect to the description above.
- line 221. Please improve the description of figure 9 and table 3, they are quite complex to understand and deserve a little bit more description.
- line 240. Replace *used as a training purpose* with *used for training purposes*.
- Section 5. The description of the section is very succinct. Please extend and illustrate better the objectives and results.
- line 243. Replace *allow* with *allows*.